

WE CLAIM:

- 1 A method for filling spaces between
patterned metal features, the method comprising
the steps of:
 - 5 coating the patterned metal features with a
first material so as to partially fill the space
between the metal features; and
treating the first material at a temperature
less than a melting point of the metal features
10 so as to cause the first material to expand.
2. The method of claim 1 wherein the
coating step comprises CVD process.
3. The method of claim 1 wherein the
coating step comprises deposition of amorphous
silicon.
4. The method of claim 1 further
comprising depositing an insulating barrier layer
on the patterned metal features before the step
of coating.
5. The method of claim 4 further
comprising the step of facet etching the
insulating barrier layer before the step of
coating.
6. The method of claim 1 wherein the step
of treating comprises plasma oxidation.
7. The method of claim 1 wherein the step
of treating comprises plasma nitridization.

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8. A method for manufacturing a semiconductor device comprising the steps of:

providing a semiconductor substrate;

forming patterned features protruding from a
5 surface of the substrate, wherein recessed areas
exist between the protruding features;

forming a material capable of expansion upon
further reaction on the protruding features;

reacting the material capable of expansion
10 to cause it to expand so as to contour the
protruding features.

9. The method of claim 8 wherein the
protruding features are gate electrodes, the
material capable of expansion comprises silicon,
and the step of forming comprises blanket
5 deposition followed by an etch leaving silicon
stringers on the protruding features.

10. The method of claim 9 wherein the step
of reacting comprises plasma oxidation.

11. The method of claim 9 wherein the step
of reacting comprises plasma nitridization.

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add